

U.S. Express .il No.: EU265089271US
Attorney Docket No.: AM-3751

IN THE CLAIMS:

Please cancel Claims 47 - 49 without prejudice. Please amend Claims 35, 38, 40, 42 - 45, 50, and 52 as follows.

1 - 4. (Previously Cancelled)

C1 5. (Once Amended / Previously Amended) A method of etching a shaped cavity in a substrate, wherein initial etching of said shaped cavity is performed using an initial process chamber pressure, wherein continued etching of the shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, and wherein etching of said shaped cavity is followed by an etch finishing step, wherein said etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

10 6. (Once Amended / Previously Amended) A method of etching a shaped cavity in a substrate, wherein the method comprises:

- a) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure;
- b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is within a range of about 25 % to about 50 % lower than said initial process chamber pressure; and
- c) an additional etch step following step b), during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40 % lower than the process chamber pressure used during the performance of step b).

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11. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰, wherein said etch step c) is performed using a process chamber pressure that is within a range of about 40% to about 50% lower than the process chamber pressure used during the performance of etch step b).

12. (Original) The method of Claim ~~6~~¹⁰, wherein said method further comprises an etch finishing step, wherein said etch finishing step is performed using a process chamber pressure that is within a range of about 80 % to about 100 % of said initial process chamber pressure.

13. (Once Amended / Previously Amended) The method of Claim ~~8~~¹², wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.

14. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰, or Claim ~~8~~¹², wherein said substrate comprises single-crystal silicon, and etching is performed using a plasma containing reactive fluorine species.

11. (Previously Cancelled)

15. (Once Amended / Previously Amended) The method of Claim ~~10~~¹⁴, wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

16. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰, or Claim ~~8~~¹², wherein etching is performed using a plasma generated from a source gas comprising a gas selected from the group consisting of SF₆, CF₄, Cl₂, HBr, and combinations thereof.

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~~18~~ 14. (Once Amended / Previously Amended) The method of Claim ~~13~~¹⁶, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

~~17~~ ~~15~~. (Original) The method of Claim ~~13~~¹⁶, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

~~19~~ ~~16~~. (Original) The method of Claim ~~14~~¹⁸, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

17 - 22. (Previously Cancelled)

~~20~~ ~~23~~. (Once Amended / Previously Amended) The method of Claim ~~6~~¹⁰ or Claim ~~8~~¹², wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate

~~21~~ ~~24~~. (Once Amended / Previously Amended) The method of Claim ~~23~~²⁰, wherein said substrate comprises single-crystal silicon and said protective layer comprises silicon oxide.

25 - 26. (Previously Cancelled)

~~2~~ ~~27~~. (Previously Added) The method of Claim ~~5~~¹, wherein said substrate comprises single-crystal silicon, and etching is performed using a plasma containing reactive fluorine species.

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3 28. (Previously Added) The method of Claim 27, wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

4 29. (Previously Added) The method of Claim 5, wherein etching is performed using a plasma generated from a source gas comprising a gas selected from the group consisting of SF₆, CF₄, Cl₂, HBr, and combinations thereof.

6 30. (Previously Added) The method of Claim 29, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

C 31. (Previously Added) The method of Claim 29, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

7 32. (Previously Added) The method of Claim 30, wherein said plasma source gas further comprises an essentially nonreactive, diluent gas selected from the group consisting of He and Xe.

8 33. (Previously Added) The method of Claim 5, wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate.

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9 34. (Previously Added) The method of Claim ~~33~~⁸, wherein said substrate comprises single-crystal silicon and said protective layer comprises silicon oxide.

22 35. (Twice Amended / Presently Amended) A method of etching a shaped cavity in a substrate, wherein the method comprises:

- a) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure; and
- b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein etching is performed using a plasma which consists generated from a source gas consisting essentially of chemically reactive species generated from SF₆ and Ar which are used in combination with species generated from an inert gas.

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WJ 24 36. (Once Amended / Previously Amended) The method of Claim ~~35~~²², wherein said at least one additional etch step includes a first etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure.

25 37. (Once Amended / Previously Amended) The method of Claim ~~36~~²⁴, wherein said first etch step is performed using a process chamber pressure that is about 30% lower than said initial process chamber pressure.

26 38. (Previously Added / Twice Amended / Currently Amended) The method of Claim 37, A method of etching a shaped cavity in a single crystal silicon substrate, wherein the method comprises:

- a) an initial cavity etch step during which said single crystal silicon substrate is etched to form a shaped cavity using an initial process chamber pressure; and

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b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25 % lower than said initial process chamber pressure, wherein etching is performed using a plasma generated from a source gas comprising SF₆ and Ar, wherein said at least one additional etch step includes a first additional etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure, and wherein said at least one additional etch step further includes a second additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40% lower than the process chamber pressure used during the performance of said first additional etch step.

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27 39. (Previously Added / Once Amended / Previously Amended) The method of Claim 35,
wherein said second additional etch step is performed using a process chamber pressure that is within a range of about 40% to about 50% lower than the process chamber pressure used during the performance of said first additional etch step.

28 40. (Previously Added / Once Amended / Currently Amended) The method of Claim 35 or Claim 36 or Claim 39; A method of etching a shaped cavity in a single crystal silicon substrate, wherein the method comprises:

- a) an initial cavity etch step during which said single crystal silicon substrate is etched to form a shaped cavity using an initial process chamber pressure; and
- b) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein etching is performed using a plasma generated from a source gas comprising SF₆ and Ar, and wherein, subsequent to said at least one additional etch step, an etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

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~~29~~ 41. (Previously Added) The method of Claim ~~40~~²⁸, wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.

~~30~~ 42. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²⁶ or ~~38~~ or ~~Claim 40~~²⁸, wherein said plasma source gas further comprises an additive gas selected from the group consisting of O₂, HBr, Cl₂, N₂, and combinations thereof.

~~31~~ 43. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²⁶ or ~~38~~ or ~~Claim 40~~²⁸, wherein said plasma source gas further comprises an additive gas selected from the group consisting of Ar, O₂, HBr, Cl₂, N₂, and combinations thereof, wherein said additive gas is provided in an amount sufficient to improve profile control during etching.

~~C1~~
~~CM~~ 23 44. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²² or ~~38~~ or ~~Claim 42~~ or ~~Claim 43~~, wherein said plasma source inert gas further comprises an essentially nonreactive, diluent gas is selected from the group consisting of Ar, He and Xe.

~~32~~ 45. (Previously Added / Once Amended / Currently Amended) The method of Claim ~~35~~²², ~~38~~ or ~~Claim 40~~²⁶, wherein said method includes performing the following steps prior to said initial cavity etch step: etching said substrate to a predetermined depth to form a shaped opening, then forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate.

~~33~~ 46. (Previously Added) The method of Claim ~~45~~³³, wherein said protective layer comprises silicon oxide.

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47. (Cancelled, Without Prejudice)

48. (Cancelled, Without Prejudice)

49. (Cancelled, Without Prejudice)

34 50. (Previously Added / Twice Amended / Currently Amended) The method of Claim 48,

A method of etching a shaped cavity in a substrate, wherein the method comprises:

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- a) etching said substrate to a predetermined depth to form a shaped opening;
 - b) forming a conformal protective layer overlying at least a sidewall of said shaped opening, wherein said protective layer comprises a material having a different etch selectivity than said substrate;
 - c) an initial cavity etch step during which said substrate is etched to form a shaped cavity using an initial process chamber pressure; and
 - d) at least one additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 25% lower than said initial process chamber pressure, wherein said at least one additional etch step includes a first additional etch step which is performed using a process chamber pressure that is within a range of about 30% to about 50% lower than said initial process chamber pressure, and wherein said at least one additional etch step further includes a second additional etch step during which continued etching of said shaped cavity is performed using a process chamber pressure that is at least 40% lower than the process chamber pressure used during the performance of said first additional etch step.

35 51. (Previously Added / Once Amended / Previously Amended) The method of Claim 50,
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 wherein said second additional etch step is performed using a process chamber pressure that is within

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a range of about 40% to about 50% lower than the process chamber pressure used during the performance of said first additional etch step.

3652. (Previously Added / Once Amended / Currently Amended) The method of ~~Claim 47 or 34~~ ³⁶ Claim 48 or Claim 50, wherein, subsequent to said at least one additional etch step, an etch finishing step is performed using a process chamber pressure that is within a range of about 80% to about 100% of said initial process chamber pressure.

Cl a *3753.* (Previously Added) The method of Claim ³⁶ 52, wherein said etch finishing step is performed using a process chamber pressure that is about 90% of said initial process chamber pressure.